AD-A116 150 AIR FORCE AEROSPACE MEDICAL RESEARCH LAB WRIGHT-PATT--ETC F/G 1/2
USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK. VOLUME 164. MD-1 HEA--ETC(U)
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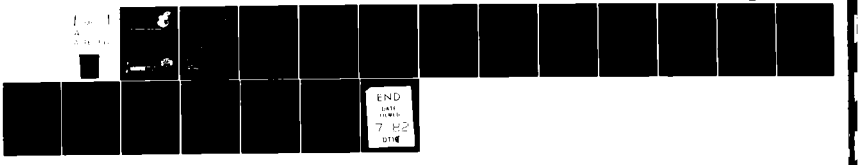

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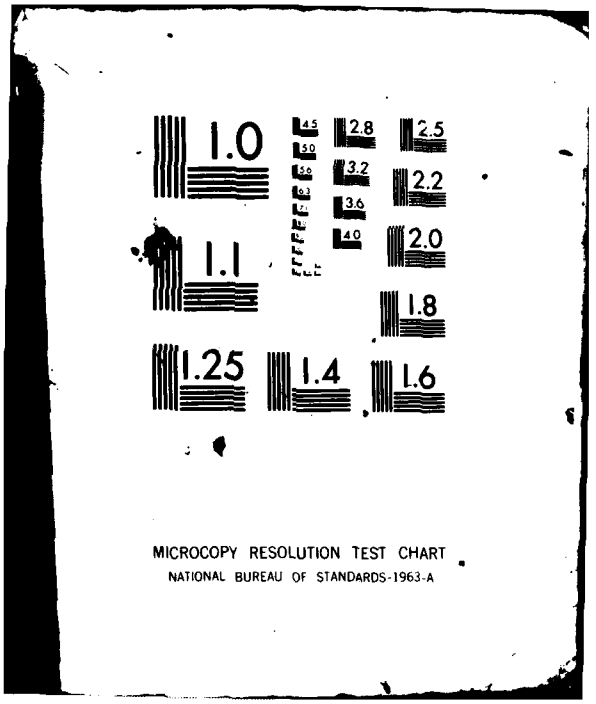
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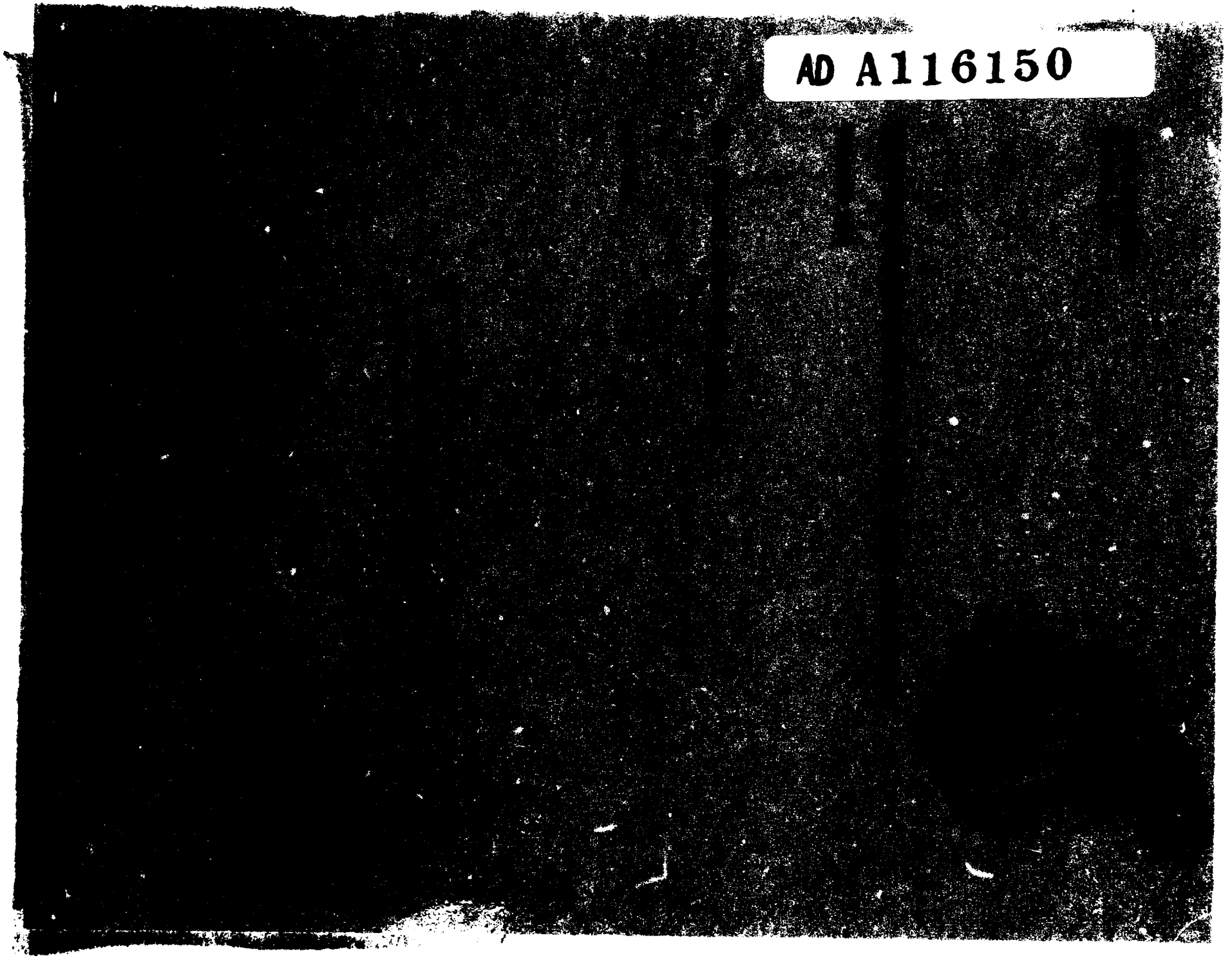
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The MD-1 heater is an electric motor-driven, portable ground heater used primarily for cockpit and cabin temperature control. This report provides measured and extrapolated data defining the bioacoustic environments produced by this unit operating outdoors on a concrete apron at normal rated conditions. Near-field data are reported for 37 locations in a wide variety of physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise

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levels, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Refer to Volume 1 of this handbook, "USAF Bioenvironmental Noise Data Handbook, Vol 1: Organization, Content and Application," AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc.

PREFACE

This report was prepared by the Biodynamic Environment Branch, Air Force Aerospace Medical Research Laboratory, under Project/Task 723107, Measurement and Prediction of Noise Environments of Air Force Operations.

The author gratefully acknowledges Mr. John N. Cole for his assistance in preparing this report, Mr. Robert G. Powell for his assistance in acquiring the raw data, Mr. Henry T. Mohlman and Mr. Fred D. Lampley of the University of Dayton for their assistance in the mechanics of data processing and Mrs. Norma J. Peachey who typed and prepared the graphics.

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INTRODUCTION

The MD-1 heater is an electric motor-driven, portable ground heater used primarily for cockpit and cabin temperature control. This unit is manufactured by the American Air Filter Company, Inc.

This volume provides measured and extrapolated data defining bioacoustic environments produced by this unit. Such data are essential to evaluate ear protection requirements, limiting personnel exposure times, voice communication capabilities, and annoyance problems associated with operations of the MD-1.

This volume is one of a series published by the Air Force Aerospace Medical Research Laboratory (AFAMRL) under the same report number (AMRL-TR-75-50) as a multi-volume handbook that quantifies the noise environments produced at flight/ground crew locations and in surrounding communities by operations of Air Force aircraft and ground support equipment. The far-field, community-type, noise data in the handbook describe the noise produced during ground operations of aircraft, ground support equipment, and other ground-based equipment or facilities.

Volume 1 of this handbook discusses the objectives and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. Refer to Volume 1 (reference 1) for such information because it is not repeated in other handbook volumes.

A cumulative index lists those aerospace systems contained in the handbook, and identifies the specific volumes containing each type of environmental noise data available (i.e., inflight/flight crew and passenger noise, near-field ground crew noise, far-field/community noise). Volume numbers are assigned sequentially as individual volumes are published. This index is periodically updated as individual volumes are published and is available upon request from AFAMRL/BBE, Wright-Patterson AFB, OH 45433. Organizations on the distribution list for the handbook will automatically receive a copy of each updated index as it is generated.

Direct any questions concerning the technical data in this report and other handbook volumes to: AFAMRL/BBE, Wright-Patterson AFB, OH 45433; AUTOVON 78-53675 or 78-53664; Commercial (513) 255-3675 or (513) 255-3664.

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1. *Cole, John N., USAF Bioenvironmental Noise Data Handbook, Volume 1: Organization, Content and Application, AMRL-TR-75-50(1), Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio, 1975.*

NEAR-FIELD NOISE

MEASUREMENT

A standard MD-1 heater was operated outside in front of radar docks used for aircraft maintenance, on a concrete slab, at a normal rated condition. Due to the proximity of the radar docks no far-field data were acquired.

Figure 1 identifies 36 noise measurement locations at a height of 1.5 meters above the concrete apron (nominal ear level of ground crew). The 0 degree reference direction passes through the tow bar. The 36 locations on the two inner circles are in the acoustic near-field of the source where the sound wave fronts generally do not spherically diverge and the source appears to be spatially distributed (i.e., not a point source). Consequently, these near-field data cannot be extrapolated to longer distances but do properly define the levels at locations close to the unit.

Near-field measurements were also made at ear level at the operator control panel. Table 1 lists the numeric/alphabetic designators used on the data pages in this report to identify the operator measurement location and test conditions. The designator 1/A means operator location 1 and test condition A. Such a descriptor is essential in many handbook volumes that involve multiple combinations of location/conditions. It is used in this report to maintain format consistency.

RESULTS

The measured data presented in Table 2 define the sound pressure levels (SPL) produced by the MD-1 unit at the 37 specified, near-field locations. This table includes the overall, 1/3 octave band, and octave band levels. From these data one can calculate the variety of measures in Table 3 which are widely used to assess the effects of noise on personnel and their performance.

For data at other intermediate near-field locations (i.e., for radial distances less than 4 meters) you can interpolate between the 36 measured data points.

TABLE 1

MEASUREMENT LOCATIONS AND TEST CONDITIONS
FOR OPERATOR NOISE MEASUREMENTS

MD-1 Heater, Duct Type, Portable
Tyndall AFB, 19 June 1980
NSN 4520-01-012-3055

Measurement Location		
1	Operator Control Panel	
Operation		
A	3450	RPM
Meteorology		
Temperature	29	°C
Bar Pressure	.761	m Hg
Rel Humidity	69	%
Wind - Speed	3.1	m/sec (6 Kts)

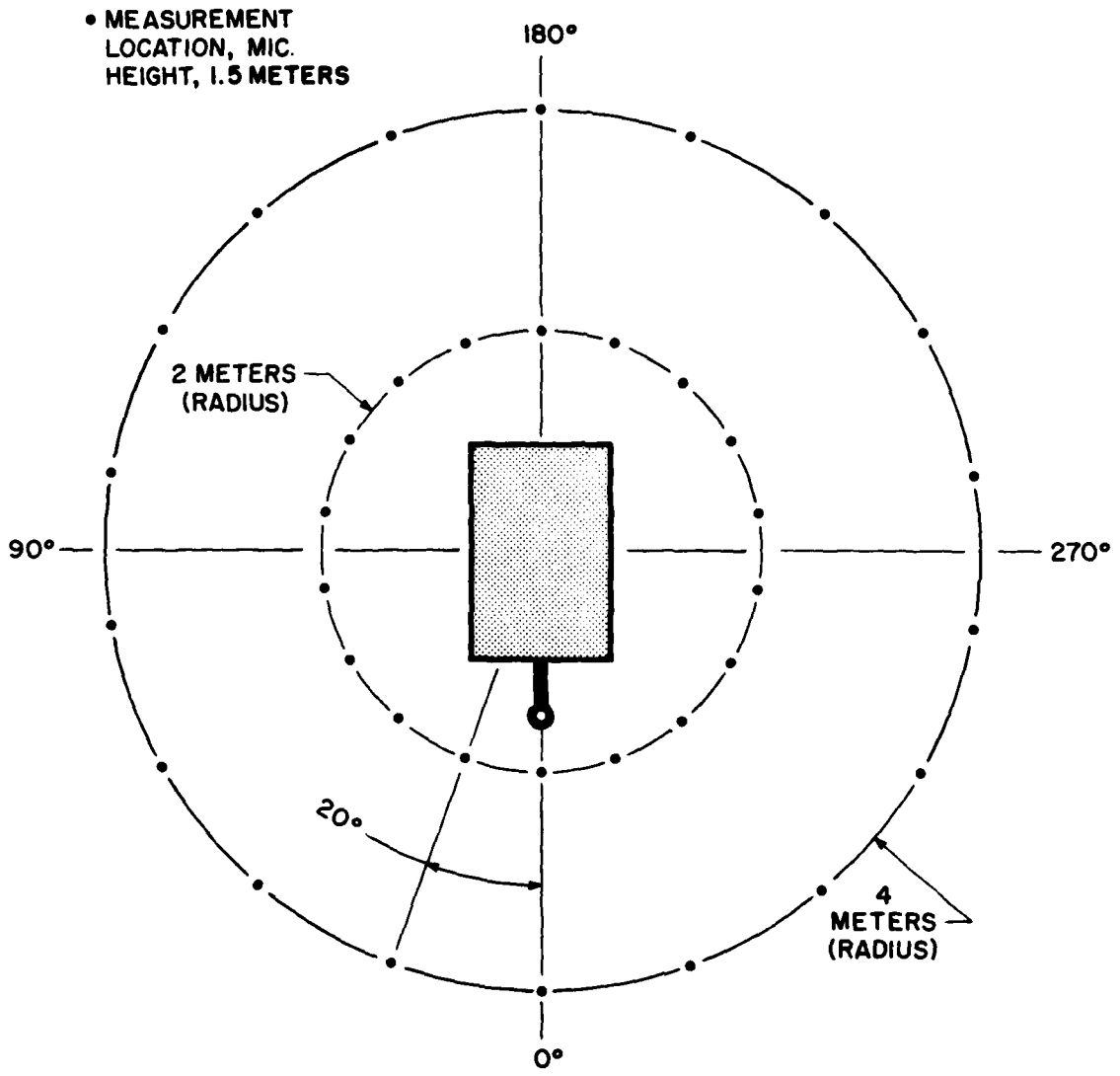

Figure 1. Measurement Locations

TABLE: 2 MEASURED SOUND PRESSURE LEVEL (DB)
1/3 OCTAVE BAND

IDENTIFICATION:
OMEGA 3.2
TEST BA-000-005
RUN 01
06 APR 82
PAGE F1

NOISE SOURCE/SUBJECT:
MD-1 HEATER
GROUND CREW
NEAR FIELD NOISE LEVELS

OPERATION:
3450 RPM

LOCATION/CONDITION

FREQ (HZ)	DISTANCE (M)->	4	4	4	4	4	4	4	4	4	4	4	4	4
	ANGLE (DEG)-->	0	20	40	60	80	100	120	140	160	180	200	220	240
	CONDITION---->	A	A	A	A	A	A	A	A	A	A	A	A	A
25														
31.5														
40														
50														
63														
80														
100														
125		73<	72<		71<	72<	74<	74<	72<	74<		74<	73<	74<
160		69<	69<	70<	69<	70<	73<	74<	74<	73<	70<	69<	71<	69<
200		70<	70<	69<	69<	72<	67<	70<	66<	68<	68<	70<	67<	68<
250		65<	65<	64<	66<	67<	68<	70<	66<	64<	63<	65<	67<	67<
315		68<	67<	65<	65<	62<	63<	62<			64<	65<	64<	65<
400		73	72	69	66<	65<	63<	66<	67<	65<	66<	66<	64<	64<
500		72	71	68	65<	64<	63<	63<	64<	67<	65<	66<	65<	65<
630		73	75	70	66	64<	64<	66<	65<	66<	68	65<	69	67
800		70	71	67	65<	63<	64<	62<	64<	64<	64<	61<	65<	64<
1000		66	70	68	68	62<	61<	59<	60<	60<	60<	61<	61<	61<
1250		65	69	68	72	61<	64	61<	63	61<	60<	61<	60<	61<
1600		63	65	64	61	57<	56<	56<	57<	55<	54<	57<	56<	56<
2000		66	67	65	63	60	57<	60	56<	56<	53<	57<	56<	56<
2500		64	65	64	61	57	55<	54<	55<	54<	52<	56	55<	54<
3150		64	64	64	61	56	54<	54<	54<	53<	52<	53<	53<	54<
4000		61	62	60	57	53	52<	52<	52<	51<	49<	51<	51<	52<
5000		60	62	59	56	52	52	50<	50<	50<	47<	49<	50<	50<
6300		57	59	57	54	49<	48<	47<	47<	46<	45<	47<	47<	48<
8000		54	57	54	50<	44<	42<	43<	44<	45<	41<	45<	44<	43<
10000		50	53	51	47<	41<	40<	40<	39<	39<		40<	39<	39<
OVERALL		81	82	79	79	78	79	79	78	79	76	78	78	78

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: 2 MEASURED SOUND PRESSURE LEVEL (DB) 1/3 OCTAVE BAND

IDENTIFICATION:
OMEGA 3.2
TEST 8A-000-005
RUN 02
06 APR 82
PAGE F2

NOISE SOURCE/SUBJECT:
MJ-1 HEATER
GROUND CREW
NEAR FIELD NOISE LEVELS

OPERATION:
3450 RPM

LOCATION/CONDITION

FREQ (HZ)	DISTANCE (M)-->	4	4	4	4	4	2	2	2	2	2	2	2	2
	ANGLE (DEG)-->	260	280	300	320	340	0	20	40	60	80	100	120	140
	CONDITION---->	A	A	A	A	A	A	A	A	A	A	A	A	A
25														
31.5														
40														
50														
63														
80														
100														
125		73<		72<	76<	74<	76<	73<	72<	73<	71<	74<	73<	72<
160		70<	72<	70<	69<	68<	76<	76<	76<	74<	69<	71<	72<	72<
200		69<	71<	6a<	72<	71<	80	81	78	74<	71<	69<	67<	67<
250		66<	68<	68<	68<	68<	80	81	78	76	71<	70<	69<	68<
315		63<	62<	63<	65<	69<	75	76	73	73	69<	69<	67<	67<
400		64<	64<	67<	71	72	77	76	75	72	69	69	67<	67<
500		62<	62<	65<	69	69	76	74	73	68	68	66<	65<	67<
630		54<	66	66	68	69	74	79	78	71	69	69	68	70
800		63<	61<	62<	64<	67	74	76	75	59	66	58	68	64<
1000		61<	61<	63	66	69	73	72	73	68	66	62<	64	64
1250		62	62	64	67	70	74	74	78	69	69	64	65	66
1600		56<	59<	59<	62	63	69	71	69	64	60	59<	59<	58<
2000		57<	59	62	66	65	68	71	70	65	61	60	59	61
2500		54<	56	60	62	63	68	71	69	64	59	58	58	58
3150		54<	56	60	61	63	68	69	68	63	59	57	57	56
4000		53	54	58	57	60	65	68	65	59	56	54	54	54
5000		50<	51<	56	57	59	64	67	63	58	55	53	53	53
6300		45<	49<	53	54	57	62	64	61	55	53	50<	49<	49<
8000		43<	45<	50<	51	54	56	59	57	52	47<	47<	46<	46<
10000		39<	41<	47<	48<	51	52	56	52	48<	45<	44<	43<	43<
OVERALL		78	77	78	81	81	87	88	87	83	80	80	79	79

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: 2 — MEASURED SOUND PRESSURE LEVEL (DB), 1/3 OCTAVE BAND

NOISE SOURCE/SUBJECT: MD-1 HEATER; GROUND CREW; NEAR FIELD NOISE LEVELS

OPERATION: 3450 RPM

IDENTIFICATION: OMEGA 5.2; TEST 88-000-005; RUN 03; 06 APR 88; PAGE F8

FREQ (HZ)	DISTANCE (M) ->	2	2	2	2	2	2	2	2	2	2	OPERATOR LOCATION
	ANGLE (DEG) -->	160	180	200	220	240	260	280	300	320	340	TEST CONDITION
	CONDITION ---->	A	A	A	A	A	A	A	A	A	A	1/A
25												
31.5												
40												
50												74<
63												75<
80												72<
100									72<			73<
125		73<	72<	74<	74<	74<	72<	71<	74<	75<	76<	80<
160		72<	74<	77<	78<	76<	75<	73<	73<	72<	75<	83
200		72<	76	72<	71<	67<	67<	66<	70<	75<	73	77
250		71<	72<	71<	68<	66<	67<	70<	71<	75	73	75
315		69<	67<	68<	67<	65<	67<	68<	69<	71<	74	72<
400		72	72	71	68	69	66<	69	71	73	75	75
500		68	69	69	67<	66<	65<	67<	67<	71	74	73
630		70	71	69	71	67	67	67	67	70	74	74
800		65	66	68	69	65	64<	63<	65	69	72	72
1000		65	66	69	66	63	62<	64	63	69	70	70
1250		64	65	72	68	65	63	67	66	71	70	72
1600		60	61	61	59<	58<	57<	59<	61	67	68	65
2000		60	61	61	61	58<	57<	60	63	67	69	66
2500		58	59	60	58	56	56	58	60	65	68	62
3150		57	58	58	57	55	56	57	60	64	63	61
4000		55	56	56	55	54	54	54	57	60	64	59
5000		53	54	53	54	53	52	52	55	60	62	57
6300		50<	51	52	50<	48<	48<	48<	52	57	59	54
8000		45<	49<	49<	48<	46<	45<	46<	49<	54	56	54
10000		42<	44<	44<	43<	43<	43<	43<	46<	50	52	47<
OVERALL		81	82	82	82	80	79	79	81	93	86	88

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: 2 MEASURED SOUND PRESSURE LEVEL (DB) OCTAVE BAND

IDENTIFICATION:
OMEGA 3.2
TEST BA-000-005
RUN 01
06 APR 82
PAGE J1

NOISE SOURCE/SUBJECT:
MD-1 HEATER
GROUND CREW
NEAR FIELD NOISE LEVELS

OPERATION:
3450 RPM

LOCATION/CONDITION

FREQ (HZ)	DISTANCE (M)->	4	4	4	4	4	4	4	4	4	4	4	4	4
	ANGLE (DEG)-->	0	20	40	60	80	100	120	140	160	180	200	220	240
	CONDITION---->	A	A	A	A	A	A	A	A	A	A	A	A	A
31.5														
63														
125		74	74		73	74	77	77	76	77		75	75	75
250		73	72	72	72	73	71	71	69	69	70	72	71	71
500		77	77	73	70	69	68	70	71	71	71	70	72	70
1000		73	75	72	74	67	68	68	67	67	67	66	67	67
2000		69	70	69	67	63	61	62	61	60	58	61	61	60
4000		67	67	66	63	59	57	57	57	56	54	56	56	57
8000		59	62	59	50	51	49	49	49	49	46	49	49	49
OVERALL		81	82	78	79	75	79	79	78	79	75	78	78	78

TABLE: 2 MEASURED SOUND PRESSURE LEVEL (DB) OCTAVE BAND

IDENTIFICATION:
OMEGA 3.2
TEST BA-000-005
RUN 02
06 APR 82
PAGE J2

NOISE SOURCE/SUBJECT: MD-1 HEATER
GROUND CREW
NEAR FIELD NOISE LEVELS

OPERATION: 3453 RPM

	LOCATION/CONDITION												
FREQ (HZ)	DISTANCE (M) ->	4	4	4	4	4	2	2	2	2	2	2	2
	ANGLE (DEG) -->	260	280	300	320	340	0	20	40	60	80	100	120	140
	CONDITION ---->	A	A	A	A	A	A	A	A	A	A	A	A	A
31.5														
63														
125		75		74	77	75	79	77	77	76	73	76	76	75
250		71	73	72	74	74	83	85	82	79	75	74	73	72
500		69	69	71	74	75	80	82	80	75	74	73	72	73
1000		67	66	68	70	73	78	80	80	73	72	70	71	69
2000		61	62	65	68	68	73	76	74	69	65	64	63	64
4000		57	59	63	63	66	71	73	71	65	61	60	60	59
8000		48	51	55	56	59	63	66	63	57	54	52	51	51
OVERALL		79	75	78	81	81	87	88	87	83	80	80	79	79

TABLE: 2 MEASURED SOUND PRESSURE LEVEL (DB) OCTAVE BAND

IDENTIFICATION:
OMEGA 3.2
TEST BA-000-005
RUN 03
06 APR 82
PAGE 33

NOISE SOURCE/SUBJECT:
MD-1 HEATER
GROUND CREW
NEAR FIELD NOISE LEVELS

OPERATION:
3450 ROM

FREQ (HZ)	DISTANCE (M)-> / ANGLE (DEG)---> / CONDITION---->	LOCATION/CONDITION 2 160 A	2 180 A	2 200 A	2 220 A	2 240 A	2 260 A	2 280 A	2 300 A	2 320 A	2 340 A	OPERATOR LOCATION TEST CONDITION 1/A
31.5												
63												79
125		75	76	79	79	78	77	75	78	77	78	85
250		75	78	75	74	72	72	74	75	79	82	80
500		75	76	74	74	72	71	72	73	76	79	79
1000		69	70	73	72	69	68	70	70	75	76	76
2000		64	65	65	64	62	62	64	66	71	73	69
4000		60	61	61	60	58	59	60	63	66	70	64
8000		52	54	54	53	51	51	51	54	59	61	57
OVERALL		81	82	82	82	80	79	79	81	83	86	88

TABLE: MEASURES OF HUMAN NOISE EXPOSURE

3

IDENTIFICATION:

OMEGA 3.2
TEST BA-000-005
RUN 01

06 APR 82

PAGE M1

NOISE SOURCE/SUBJECT:
MD-1 HEATER
GROUND CREW
NEAR FIELD NOISE LEVELS

OPERATION:
3450 RPM

	LOCATION/CONDITION												
DISTANCE (M)->	4	4	4	4	4	4	4	4	4	4	4	4	4
ANGLE (DEG)-->	0	20	40	60	80	100	120	140	160	180	200	220	240
CONDITION---->	A	A	A	A	A	A	A	A	A	A	A	A	A
HAZARD/PROTECTION													
C-WEIGHTED OVERALL SOUND LEVEL (OASLC IN DBC) AT EAR													
A-WEIGHTED OVERALL SOUND LEVEL (OASLA IN DBA) AT EAR													
MAXIMUM PERMISSIBLE TIME (T IN MINUTES) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)													
NO PROTECTION													
OASLC	81	82	79	79	78	79	79	78	78	76	78	78	78
OASLA	76	79	77	76	72	72	72	72	72	72	71	72	72
T	960	960	960	960	960	960	960	960	960	960	960	960	960
MINIMUM OPL EAR MUFFS													
OASLA*	53	58	54	55	55	57	57	56	56	53	56	55	55
T	960	960	960	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS													
OASLA*	52	52	49	50	50	52	52	51	51	48	51	50	51
T	960	960	960	960	960	960	960	960	960	960	960	960	960
V-51R EAR PLUGS													
OASLA*	54	55	52	51	48	49	49	49	49	44	49	49	49
T	960	960	960	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS													
OASLA*	40	41	38	38	35	35	35	35	35	34	35	35	35
T	960	960	960	960	960	960	960	960	960	960	960	960	960
H-133 GROUND COMMUNICATION UNIT													
OASLA*	50	51	49	49	46	47	46	46	46	43	45	45	45
T	960	960	960	960	960	960	960	960	960	960	960	960	960
COMMUNICATION													
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)													
PSIL	73	74	72	70	66	65	66	66	66	65	66	66	66
ANNOYANCE													
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)													
TONE CORRECTION (C IN DB)													
PNLT	93	94	92	91	87	87	87	87	86	85	86	87	86
C	3	3	3	3	3	3	3	3	3	3	3	3	3

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.

TABLE: 3 MEASURES OF HUMAN NOISE EXPOSURE	IDENTIFICATION: OMEGA 3.2 TEST BA-000-005 RUN 02 06 APR 82 PAGE M2
NOISE SOURCE/SUBJECT: MD-1 HEATER GROUND CREW NEAR FIELD NOISE LEVELS	OPERATION: 3450 RPM

LOCATION/CONDITION													
DISTANCE (M)-->	4	4	4	4	4	2	2	2	2	2	2	2	2
ANGLE (DEG)-->	260	280	300	320	340	0	20	40	60	80	100	120	140
CONDITION---->	A	A	A	A	A	A	A	A	A	A	A	A	A
HAZARD/PROTECTION													
C-WEIGHTED OVERALL SOUND LEVEL (OASLC IN DBC) AT EAR													
A-WEIGHTED OVERALL SOUND LEVEL (OASLA IN DBA) AT EAR													
MAXIMUM PERMISSIBLE TIME (T IN MINUTES) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)													
NO PROTECTION													
OASLC	77	77	78	81	81	87	86	85	83	80	80	79	79
OASLA	71	72	73	76	77	83	85	84	78	76	74	74	74
T	960	960	960	960	960	571	404	480	960	960	960	960	960
MINIMUM QPL EAR MUFFS													
OASLA*	55	54	55	58	57	63	64	62	59	56	57	56	56
T	960	960	960	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS													
OASLA*	50	49	50	53	52	59	59	57	55	51	52	51	51
T	960	960	960	960	960	960	960	960	960	960	960	960	960
V-51R EAR PLUGS													
OASLA*	48	48	49	52	53	59	61	60	55	52	51	51	51
T	960	960	960	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS													
OASLA*	34	34	35	38	39	45	46	46	40	38	37	37	37
T	960	960	960	960	960	960	960	960	960	960	960	960	960
H-133 GROUND COMMUNICATION UNIT													
OASLA*	45	45	46	49	50	55	57	56	51	48	47	47	47
T	960	960	960	960	960	960	960	960	960	960	960	960	960
COMMUNICATION													
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)													
PSIL	65	66	68	71	72	77	79	78	72	70	69	68	69
ANNOYANCE													
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)													
TONE CORRECTION (C IN DB)													
PNLT	85	86	89	92	92	98	100	98	93	90	89	88	89
C	3	3	3	3	3	3	3	3	3	3	3	3	3

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.

TABLE: 3 MEASURES OF HUMAN NOISE EXPOSURE

IDENTIFICATION:
OMEGA 3.2
TEST BA-000-005
RUN 01
06 APR 82
PAGE H3

NOISE SOURCE/SUBJECT:
MD-1 HEATER
GROUND CREW
NEAR FIELD NOISE LEVELS

OPERATION:
3430 ROM

	LOCATION/CONDITION										
DISTANCE (M)->	2	2	2	2	2	2	2	2	2	2	OPERATOR LOCATION
ANGLE (DEG)-->	160	180	200	220	240	260	280	300	320	340	TEST CONDITION
CONDITION--->	A	A	A	A	A	A	A	A	A	A	1/A
HAZARD/PROTECTION											
C-WEIGHTED OVERALL SOUND LEVEL (OASLC IN DBC) AT EAR											
A-WEIGHTED OVERALL SOUND LEVEL (OASLA IN DBA) AT EAR											
MAXIMUM PERMISSIBLE TIME (T IN MINUTES) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)											
NO PROTECTION											
OASLC	80	82	82	82	80	79	79	81	83	86	88
OASLA	75	76	78	76	74	73	74	75	79	81	81
T	960	960	960	960	960	960	960	960	960	807	807
MINIMUM OPL EAR MUFFS											
OASLA*	58	59	59	60	58	57	55	59	60	62	65
T	960	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS											
OASLA*	53	54	54	54	53	52	51	54	55	57	61
T	960	960	960	960	960	960	960	960	960	960	960
V-51R EAR PLUGS											
OASLA*	52	53	54	53	51	50	51	52	55	58	58
T	960	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS											
OASLA*	38	39	40	39	37	36	37	38	41	43	44
T	960	960	960	960	960	960	960	960	960	960	960
H-133 GROUND COMMUNICATION UNIT											
OASLA*	48	49	51	50	48	47	47	49	52	54	55
T	960	960	960	960	960	960	960	960	960	960	960
COMMUNICATION											
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)											
PSIL	69	70	72	70	66	67	69	70	74	76	75
ANNOYANCE											
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)											
TONE CORRECTION (C IN DB)											
PNLT	90	91	92	91	89	88	89	89	94	97	95
C	3	3	3	3	3	3	3	1	3	3	2

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.

END

DATE
FILMED

7 82

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